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GNRO-2007/00041

July 16, 2007

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

Subject: LER 2007-002-00 - Reactor SCRAM due to Turbine Trip caused by Loss of Condenser Vacuum
Grand Gulf Nuclear Station, Unit 1
Docket No. 50-416
License No. NPF-29

Dear Sir or Madam:

Attached is Licensee Event Report (LER) 2007-002-00 which is a final report.

This letter does not contain any commitments.

Yours truly,

CAB/WBA
attachment: LER 2007-002-00
cc: (See Next Page)

cc: NRC Senior Resident Inspector
Grand Gulf Nuclear Station
Port Gibson, MS 39150

U. S. Nuclear Regulatory Commission
ATTN: Dr. Bruce S. Mallet (w/2)
Regional Administrator, Region IV
611 Ryan Plaza Drive, Suite 400
Arlington, TX 76011-4005

U. S. Nuclear Regulatory Commission
ATTN: Mr. Bhalchandra Vaidya, NRR/DOLR (w/2)
ATTN: ADDRESSEE ONLY
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NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
Grand Gulf Nuclear Station (GGNS), Unit 1	05000416	1 OF 3

4. TITLE
Reactor SCRAM due to Turbine Trip caused by Loss of Condenser Vacuum

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									N/A	N/A
05	19	2007	2007	- 002 -	00	07	16	2007	FACILITY NAME: N/A	DOCKET NUMBER: N/A

9. OPERATING MODE
1

10. POWER LEVEL
100

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

- ■ 20.2201(b)
- ■ 20.2201(d)
- ■ 20.2203(a)(1)
- ☐ 20.2203(a)(2)(i)
- ☐ 20.2203(a)(2)(ii)
- ☐ 20.2203(a)(2)(iii)
- ☐ 20.2203(a)(2)(iv)
- ☐ 20.2203(a)(2)(v)
- ☐ 20.2203(a)(2)(vi)
- ☐ 20.2203(a)(3)(i)
- ☐ 20.2203(a)(3)(ii)
- ☐ 20.2203(a)(4)
- ☐ 50.36(c)(1)(i)(A)
- ☐ 50.36(c)(1)(ii)(A)
- ☐ 50.36(c)(2)
- ☐ 50.46(a)(3)(ii)
- ☐ 50.73(a)(2)(i)(A)
- ☐ 50.73(a)(2)(i)(B)
- ☐ 50.73(a)(2)(i)(C)
- ☐ 50.73(a)(2)(ii)(A)
- ■ 50.73(a)(2)(ii)(B)
- ☐ 50.73(a)(2)(iii)
- ☒ 50.73(a)(2)(iv)(A)
- ☐ 50.73(a)(2)(v)(A)
- ☐ 50.73(a)(2)(v)(B)
- ☐ 50.73(a)(2)(v)(C)
- ■ 50.73(a)(2)(v)(D)
- ☐ 50.73(a)(2)(vii)
- ☐ 50.73(a)(2)(viii)(A)
- ☐ 50.73(a)(2)(viii)(B)
- ☐ 50.73(a)(2)(ix)(A)
- ☐ 50.73(a)(2)(x)
- ☐ 73.71(a)(4)
- ☐ 73.71(a)(5)
- ■ OTHER

Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (*Include Area Code*)
Grand Gulf Nuclear Station - William B. Abraham, Senior Engineer Associate	601-437-2319

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	SG	EXJ	Stearns Rogers Eng	Y					

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On May 19, 2007 at 1127, a Reactor SCRAM from 78% Core Thermal Power (CTP) occurred due to a Main Turbine trip on low Condenser vacuum. Reactor power had been lowered from 100% to 78%, per Loss of Condenser Vacuum Off-Normal-Event Procedure (ONEP), just prior to the automatic actuation of the Reactor Protection System (RPS). Failure of a High Pressure (HP) Condenser expansion joint resulted in degrading Condenser vacuum and subsequent turbine trip over an approximately three minute period. Pressure control was initially maintained with Turbine Bypass Control valves until vacuum decreased to the point that bypass was no longer available. Then Reactor pressure was controlled using a Safety Relief Valve (SRV). Reactor water level continued to be maintained with Condensate system. This report is being submitted pursuant to 10CFR50.73(a)(2)(iv)(A).

The cause of the event was the failure of the HP Condenser expansion joint between the Main Turbine and Condenser. Failure of the expansion joint resulted in low condenser vacuum.

All Control Rods inserted fully and Reactor level did not decrease below the automatic Emergency Core Cooling System (ECCS) actuation set point (Level 2, -41.6 inches). The Reactor vessel level 3 isolation setpoint of + 11.4 inches was reached for Shutdown Cooling which was already isolated. The expansion joint was replaced to correct the condition.

A. REPORTABLE OCCURRENCE

On May 19, 2007 at 1127, an automatic Reactor SCRAM occurred due to a Main Turbine trip on low Condenser vacuum. Failure of a Condenser expansion joint resulted in Condenser vacuum decrease that led to a Turbine trip and actuation of the Reactor Protection System (RPS). This report is being submitted pursuant to 10CFR50.73(a)(2)(iv).

B. INITIAL CONDITIONS

At the time of the event, the Reactor was in OPERATIONAL MODE 1 with Reactor power at 100 percent. There were no additional inoperable structures, systems, or components at the start of the event that contributed to the event.

C. DESCRIPTION OF OCCURRENCE

On May 19, 2007, at 1124, GGNS was in normal operation at 100 percent power when the Control Room received the alarms "Off-Gas Trouble" alarm and "Condenser Turbine Expansion Joint Level Low" alarm. The HP Condenser expansion joint (1N19B007A) seal level alarm was soon followed by a decrease in Condenser vacuum and an increase in Offgas flow. In response to these conditions, Operators entered the Off-Normal-Event Procedure (ONEP), 05-1-02-V-8, "Loss of Condenser Vacuum" and reduced Reactor power to approximately 78% by reducing core flow.

As vacuum was decreasing operations established a decision point for a manual Scram prior to reaching the automatic Turbine trip setpoint of 21 inches. At 1127, a Main Turbine trip on a low Condenser vacuum occurred at 24.9 inches. This was prior to the established value for the manual scram. The early trip of the Main Turbine was the result of improper calibration of the Turbine vacuum trip setpoint. The loss of Condenser vacuum was a result of an HP Condenser boot seal failure. No SRVs actuated and Turbine Bypass Control and steam system maintained pressure until much later in the event.

After the Turbine trip, vacuum continued to lower and a decision was made to initiate a cooldown to Cold Shutdown. Turbine Bypass Control valves were used to begin depressurizing. Main Steam Isolation Valves (MSIVs) remained open for significant length of time, allowing Feedwater system to remain in service until Reactor pressure was lowered enough to provide makeup to the Reactor with Condensate Booster pumps. Additionally Control Rod Drive System (CRD) was available to provide makeup to the Reactor. Approximately five hours after the Scram, at about 200 psig Reactor pressure, MSIV's and drains were manually closed prior to the 9 inches Condenser vacuum-low MSIV isolation signal.

With the MSIVs closed one SRV was used to continue cooldown until Shutdown Cooling was in service. No heatup/cooldown limits were exceeded. Suppression Pool water level was greater than the allowable 18.81 feet after the event due to water added from SRV actuations. 05-S-01-EP-3, "Containment Control", was entered as required to lower Suppression Pool level to less than 18.81 feet. All safety-related equipment functioned as required and there was no safety system functional failures. This event is considered a Scram with a loss of normal heat removal because an SRV was used prior to placing Shutdown Cooling in service. Additionally based on the review of the new Performance Indicator criteria, this will not constitute a complicated Scram.

D. APPARENT CAUSE

The cause of the event was failure of the HP Condenser expansion joint between the Main Turbine and Condenser. A failure analysis is being performed on the expansion joint; therefore, the Root Cause of the expansion joint failure is indeterminate (Reference Root Cause Analysis Report 2007-05).

E. CORRECTIVE ACTIONS

Immediate Corrective Actions:

- Plant shutdown was conducted in accordance with the requirements of Off-Normal-Event Procedures 05-1-02-V-8, Loss of Condenser Vacuum; 05-1-02-I-1, Reactor Scram; 05-1-02-I-2, Turbine and Generator Trips and Integrated Operating Instruction (IOI) 03-1-01-4, Scram Recovery.
- Removed and replaced failed expansion joint.
- Re-calibrated Turbine vacuum trip setpoint

Long Term Corrective Actions - Condition Report GGN-2007-02743 was written to address any additional actions.

F. SAFETY ASSESSMENT

Nuclear Safety was not compromised during the event. The plant is designed for a loss of vacuum event. After MSIVs were closed, cold shutdown conditions were achieved using one Safety Relief Valve and the Residual Heat Removal (RHR) Shutdown Cooling system. Use of standby ECCS systems was not required to maintain Reactor inventory. The MSIVs remained open for significant length of time, allowing the Feedwater system to remain in service until Reactor pressure was lowered enough to provide makeup to the Reactor with Condensate Booster pumps. Additionally, Control Rod Drive System was available to provide makeup to the Reactor. MSIVs were then closed and Reactor pressure was then lowered with a Safety Relief Valve. During this event, even though not needed, there was sufficient high pressure makeup to the Reactor available with the Reactor Core Isolation System (RCIC) and High Pressure Core Spray System (HPCS). After Reactor pressure was lowered to below 135 psig, Shutdown Cooling was placed in service and Reactor taken to Cold Shutdown.

Radiological Safety was not affected due to failure of Condenser neck seal and subsequent scram. There was no radiological release during the event.

For above reasons, there was no challenge to Nuclear Safety.

G. ADDITIONAL INFORMATION

Previous Similar Events – Pursuant to 10CFR50.73(b)(5) there has been no similar events in the past two years at Grand Gulf Nuclear Station.